U.S. Environmental Protection Agency
Science Advisory Board
Ecological Processes and Effects Committee Augmented for Ballast Water Advisory

January 25 – 26, 2011
The Madison Hotel, 1177 15th Street, NW Washington, DC 20005

Minutes of the Meeting

Attendees:
Ecological Processes and Effects Committee (EPEC) Augmented for Ballast Water Advisory: Judy Meyer, Fred Benfield, JoAnn Burkholder, Allen Burton, Peter Chapman, William Clements, Andrew Cohen, Loveday Conquest, Robert Diaz, Fred Dobbs, Lisa Drake, Charles Haas, Thomas W. La Point, Wayne Landis, Edward Lemieux, David Lodge, Kevin Reynolds, James Sanders, Mario Tamburri (for full roster, see Attachment A)

SAB Staff Office: Iris Goodman (Designated Federal Officer)

EPA Staff: Ryan Albert

Other Attendees: Names of those who attended the face-to-face meeting, or who requested the teleconference call-in number, are provided in Attachment B.

Purpose: to discuss the draft compiled response to charge questions prepared by subgroups of the EPEC Ballast Water Advisory Panel and to assess the Panel's position on key conclusions presented in the draft compilation.

Meeting Materials:
All materials discussed at the meeting are available at the SAB Web site http://www.epa.gov/sab, at the January 25-26, 2011 Ballast Water Advisory Panel Meeting page.

Summary of Discussions

January 25, 2011
Opening remarks and roll call

This meeting was announced in the Federal Register[1] and proceeded according to the meeting agenda.[2] **Ms. Goodman**, Designated Federal Officer for the Panel, convened the meeting and noted that the Ballast Water Advisory Panel (herein, Panel) operates in accordance with the Federal Advisory Committee Act. This means that meetings are announced and open to the public, all materials prepared for or by the Panel are available to the public, and meeting minutes are prepared. She noted that the Panel's discussions during this meeting would refer to six documents that were made available on the SAB website prior to this meeting. The first document gives a summary of deballasting operations[3] and was provided by EPA in response to a request from the panel for this information. The second document is a written public comment[4] that had been received and posted; this same person had registered in advance to provide oral comments at the meeting. The third document provides comments from panelist Dr.

Welschmeyer[5] who was unable to attend this meeting. The fourth, fifth, and sixth documents are draft working papers prepared by subgroups of the Panel; these are (a) the compilation of draft text in response to all charge questions,[6] (b) draft text on onshore treatment[7] for inclusion in response to charge question 4, and (c) an appendix on Onshore Treatment.[8] Dr. Landis also made a brief presentation on the subject of risk assessment as related to managing the risks of non-native species invasions from ballast water.

Review of agenda and process to be used

Dr. Meyer welcomed the group and summarized the topics on the agenda. She noted the draft document to be discussed represents a compilation of draft responses developed by all the subgroups. She reminded everyone that it is a work in progress and does not represent consensus views of the entire panel, nor was it formatted in standard SAB report style. Rather, the draft text was compiled solely to assist the panel in its further deliberations and she asked that these drafts not be cited or quoted.

Dr. Meyer said the goal of this 2-day meeting was to reach agreement on the general content of the draft text and its conclusions, not to wordsmith. To that end, she said that today's discussion would focus on identifying substantive revisions to the draft text, and that tomorrow's discussion would focus on coming to agreement on draft conclusions and recommendations. She noted that the goal of the Panel was to complete this report in early summer 2011, in order to be useful to EPA and USCG. She requested that, after the meeting, panelists send their technical edits to the subgroup leads by mid-February, with copies to Ms. Goodman, for incorporation into the next draft for further discussion during a teleconference to be scheduled sometime in March 2011.

A. Public Comments

Dr. Raymond Vaughn, Environmental Scientist the New York State Attorney General's Office and member of New York's ballast water management gave oral comments by telephone. Dr.Vaughn noted that he would expand upon comments he made to this Panel in November 2010, specifically to describe in further detail a method he said can be used to eliminate the uncertainty associated with aggregation of organisms within ballast water. This method samples the entire contents of a relatively small but representative ballast tank, which he refers to as a "sample tank." Dr. Vaughn described how the "sample tank" should be partnered with a main ballast tank and said that both tanks should be routinely filled and discharged together, so that both tanks remain equally full on a percent basis. He further described that a sample for testing can be collected by discharging the entire contents of the sample tank through the ballast water treatment system, thereby avoiding any uncertainty that could be introduced due to aggregation of organisms within the tank. Dr. Vaughn's accompanying written comments also provided a diagram of the partnered tanks to illustrate the configuration. He also said that the draft report should relate issues of statistical confidence to sampling, with extraneous sources of error quantified.

<u>Summary of Discussions</u>

Dr. Meyer thanked Dr. Vaughn for his comments. Before turning to the discussion of specific charge questions, Dr. Meyer invited panelists to comment on ways to set the context of the report

in order to best present its draft findings and recommendations. The discussion led to agreement on the following points.

Setting the context for discussion

- The report would note the need to use a systems approach to assessing and managing the risk of species invasions across a broad range of ballast water activities, including ballast water exchange and BWMS operational procedures (drawing upon HACCP methods). **Dr. Meyer** asked four panel members to develop draft text on risk assessment methods relevant to ballast water management for review by the full panel for potential inclusion in the introduction to the report.
- One charge question refers to a "no living organism" standard, even though such a standard has not been proposed. Another table would be added to show the range in values for existing standards, such as California Phase II standards.
- There is a need for a common lexicon throughout the report, especially clarification of terms such as "ballast water management system" (BWMS*)* and "Type approval." D**r. Meyer** noted the final report would include a glossary of key phrases.

Statistical issues related to ballast water treatment

After a brief midmorning break, **Drs. Drake and Conquest** gave a brief overview of the draft text and led the discussion, resulting in agreement on the following points.

- Clarification of statistical issues should be presented early in the document.
- Emphasize the role of statistical theory in determining practical limits to sampling and evaluation of treatment performance.
- Distinguish treatment levels that may be technologically achievable from treatment levels that can be statistically evaluated and validated.
- Distinguish between testing procedures for Type Approval and those for routine compliance testing.
- Emphasize importance of collecting a representative sample
- Include references to empirical data on the distribution of ballast water organisms, to better balance the discussion of bead experiments used to estimate distributions.
- Statistics section should note distinctions in standards for bacteria, viruses, for different organism size classes, and should summarize the statistical challenges for these organism types and sizes, including by different levels of proposed standards (e.g., 10x, 100x D-2).

Draft response to Charge Questions 1 and 2 regarding available data on ballast water treatment

Dr. Tamburri gave a brief overview of the draft text and led the discussion, resulting in agreement on the following points.

- The methods used by Subgroup 1 to assess BWMS performance are good, as is their summary description, but the text needs to clarify the sources of BWMS performance data and the quality of that information (e.g., third party test data, peer-reviewed journals, vendor supplied certifications).

- Other panel members reviewed the same BWMS treatment information and reached the same conclusions; all panelists should be invited to review treatment information.
- The text should better describe the attributes of "reliable" data, as used by Subgroup 1 in the review of the data and revise criteria to be statements, not questions.
- Subgroup 1 notes that the goal for their first draft was to be transparent about their methods. They appreciate the discussion by the panel and will incorporate these suggestions in order to improve transparency in the next revision.
- Subgroup 1 will make the revisions suggested to Table 4.1, for the body of the report. They will also create an expanded companion table for the Appendix which lists all the sources of data reviewed, including system name, document title, and document date.
- Subgroup 3, in their text addressing charge question 4 (limitations of available data) will refer back to the text response for questions 1 and 2, regarding the need to better standardize testing data and to make it widely available.
- The test data shows that several BWMS have dramatically and effectively reduced the numbers of live organisms in discharged ballast water, relative to intake concentrations and this is a significant achievement. However, it is not appropriate to draw parallels to the performance of drinking water treatment systems, as suggested by Dr. Welschmyer, because the neither the systems nor testing conditions are commensurate.
- The question of whether the review of existing data indicates that BWMS can meet or approach a "no living organism" standard should be simply and directly answered in the negative.

Charge question 3: System Development

Dr. Dobbs gave a brief overview of the draft text and led the discussion, resulting in agreement on the following points.

- The text on deoxygenation will be corrected to clarify that its goal is to attain severe levels of hypoxia, not anoxia, as currently stated.
- The text describing treatment processes will be revised to refer only to the generic treatment process rather than to specific vendors of that treatment.
- Several technical corrections will be made; e.g., the text about oxidant –based systems will replace the incorrect reference to use of a "reducing" agent with "oxidizing" agent.
- The text describing idealized technological designs for new BWMS will be revised to make clear that achieving D-2 x100 or D-2 x1000 standards will place much greater demands on ships and their operations (e.g., space requirements, power requirements). The text is not describing nor advocating a specific BWMS design; rather the text is providing the foundational context for understanding these demands.
- The reference to "patchiness" of organisms that can overwhelm a treatment standard does not refer to determining compliance with standards *per se*, but rather is to point out that achieving D-2x100 or D-2x1000 will require design of resilient treatment systems, not of single devices. The text will be revised to clarify this.
- Responses to charge questions that refer to "zero" or "no detectable" organisms will be reviewed to be sure they are consistently stated and to reduce redundancy.

- Public comments regarding sampling methods for detecting 100x IMO relies fundamentally on using the appropriate sample volume, which is well covered in the statistics section.

Charge question 4: Limitations of available data and future assessment needs, including onshore treatment:

Dr. Lodge gave a brief overview of the draft text and led the discussion, resulting in the following decisions.

- Selecting parameters for challenge water: panel members agreed that not all salinities or conditions could be tested. Some panelist thought the ETV protocol requirements to test two salinities is sufficient; some panelists thought a minimum of three salinities should be tested; this point will be further discussed by the subgroup.
- The text discussion regarding the lack of test standards for organisms in the 2 to < 2 µm size range will be revised to refer to organisms in the < 2 µm range, which includes bacteria, harmful protists, and small phytoplankton. It will not define a lower bound or suggest a necessary correlation among size and types of organisms.
- A table summarizing the pros and cons of candidate "surrogate" parameters for use in quantifying viable organism will be added to the text.
- In recognition of the difficulties in enumerating low numbers of very tiny organisms, the text on indirect surrogate measures will be revised to recommend that surrogate parameters be included in future compliance protocols; these surrogate parameters could be used as bulk measurements for compliance testing.
- The text on determining organism viability will be revised to include reference to ultra-filtration protocols for enumerating human enteric viruses published by EPA.
- The text entitled "reducing risk from ballast discharges" should note that: the focus is on shipboard treatment, but will include onshore and voyage-based risk assessment; be balanced in tone; and reference similar actions taken by the state of Wisconsin, and Canada.

Dr. Meyer summarized the discussion about onshore treatment, noting the following points:

- Onshore treatment of ballast water would be included in the report as part of Charge question 4, but that the Panel had further work to do to assess how the topic would be presented.
- Most panel members agreed the benefits of onshore treatment received much greater emphasis in the draft text, with scant discussion of its disadvantages (e.g., deballasting required for onshore treatment may be difficult for some types of ships).
- Some panelists expressed concern the draft text went beyond synthesis to advocacy and that emphasis on onshore treatment could divert the report's focus from EPA's near-term needs.

Dr. Meyer concluded by asking all panel members to carefully review the draft text and to send their comments to **Dr. Lodge,** Subgroup 3, and to Ms. Goodman.

Discussion of Risk Assessment and HACCP:

After a short afternoon break, Dr. Myer then turned to the topic of risk assessment and risk management, as informed by HACCP principles. She asked **Dr. Landis** to lead this discussion, which he did, making reference to a brief power point presentation that summarized the main points of the draft text which he and **Dr. Haas** had prepared, with input from Drs. Dobbs and Lodge. This discussion led to the agreement on the following points.

- Given enough time, the probability of species invasion due to ballast water is certain (i.e., is 1.0), thus, ways to manage the incident rate need to be addressed.
- The NRC report on ballast water and species invasions is expected to address issues related to thresholds for species invasions; although it is not clear that such thresholds can be quantified. The context for the EPEC report will also need to be cast in terms of thresholds, e.g., if there is no threshold, then the goal of releasing zero organisms becomes important.
- The EPEC report needs to be consistent in its discussion about "zero organisms."
- The use of operational process control points could be used to manage treatment performance when it is difficult to find surrogates for very low concentrations of organisms.
- The topic of risk management will be introduced early in the report and also following the discussion of combined approaches to managing ballast water activities to minimize discharges.

Wrap up and plans for the next day:

Dr. Meyer asked for feedback from Dr. Albert and from Dr. Everett. Dr. Everett had no comments. **Dr. Albert** made the following points:

- He supports the draft report's organization by charge questions.
- He agrees that ballast water policy needs to be enforceable, but notes that development of compliance monitoring methods will take a long time to be implemented.
- He notes that the EPA ETV protocols have been finalized, thus ETV citation in draft report should be updated.
- With respect to the draft text on onshore treatment, he notes: a) if costs are included in the text, it should also note that the cost comparisons are not either / or, as ships on international routes might need to meet both shipboard and onshore treatment requirements, b) need to include issues related to marine logistics, and c) encourages that the text not advocate a position.

Dr. Meyer asked the panel to look over the draft conclusions and to send any comments or revisions to Ms. Goodman by February 8, 2011. Dr. Meyer said she anticipated having the revised draft, including a draft Executive Summary and letter to the Administrator, posted by Feb. 25, 2011. She also said the panel should anticipate that the report would receive a quality review by the Chartered SAB in mid-April, 2011. She asked the subgroups to briefly confer about needed revisions during the remaining time available.

Ms. Goodman recessed the meeting for the day at 5:00 p.m.

January 26, 2011

The meeting was reconvened at 8:30 a.m., January 26, 2011. **Dr. Meyer** noted the morning session would be devoted to discussing the draft conclusions and recommendations, with the goal of coming to consensus on major issues. She also noted that Ms. Goodman had prepared a PowerPoint presentation based on draft conclusions excerpted from the draft text posted on the SAB website. The draft conclusions were displayed on screen to facilitate discussion and Dr. Meyer invited panelists to comment and suggest revisions for inclusion in the next iteration of the draft report.

The morning's discussion of conclusions and recommendations began with statistical issues and continues sequentially through each of the four charge questions. The discussion led to the following decisions:

Statistical issues

- There was broad agreement on all seven conclusions presented for the statistics section, with suggestions for minor edits to clarify certain points in the next iteration of draft conclusions.
- Suggestions from the panel included revisions to clarify that: the size of the needed sample volume is related to the aggregation of the organisms; statistical analyses determine whether a given standard is "measurable"(in contrast with "achievable"); that statistically measuring performance for standards such as 100x, or 1000x time IMO / P-1 is much more problematic, given the greater sample volume required; that "new and improved" methods will be need to increase detection limits for these proposed standards; and that the text better distinguish between testing for type approval and testing for compliance.

Charge question1: Performance of shipboard systems with available effluent testing data.

There was broad agreement on the basic findings about BWMS performance as stated in the draft conclusions, however there were several suggestions to provide further contextual information for the draft conclusions.

Suggestions from the panel included revisions to clarify that:

- this assessment of BWMS performance is a static "snapshot" based on existing data, whereas technologies continue to be developed over time;
- none of the existing BWMS have yet been tested under EPA's more detailed Environmental Technology Verification (ETV) protocols, which will create more reliable performance data;
- assessments and /or future projections about reaching 10x D-2 / Phase 1 standards varies by the size of the organisms (e.g., >50 µm ,the 10-50 µm size classes, and bacteria);

- existing BWMS were tested specifically for D-2 discharge standards, moreover, failures to meet D-2 are usually not reported, thus making it difficult to assess future performance capabilities.

Charge question 2: Potential performance of shipboard systems without reliable testing data.

There was broad agreement on the draft conclusions prepared in direct response to question 2. However, there were several suggestions for providing additional important contextual information.

The panel agreed to include revisions to clarify that:

- the draft conclusions refer to existing systems in their present state; i.e., the conclusions do not include potential future improvements to existing treatment technologies.
- limitations in the existing data (e.g., methods not documented, failures not reported) preclude an assessment of whether existing technologies can meet all proposed standards; nonetheless, most of the 51 BWMS technologies reviewed are based on reasonable engineering designs.

The panel also discussed the draft conclusion proposed by Dr.Welschmeyer that stated the BWMS technologies that achieved IMO Type approval meet or exceed removal efficiencies required for treatment of drinking water. The panel agreed that, while the performance of these technologies is impressive, especially within the context of shipboard applications, drawing those specific parallels was inaccurate. The panel concluded the report should convey the positive achievements of IMO-approved technologies, but that the statements must be factually accurate.

Charge question 3: Potential performance of shipboard systems without reliable testing data.

3 a. Are there reasonable changes or additions to treatment processes that can improve performance?

There was broad agreement on the draft conclusions. The panel also agreed to include revisions to:

- Within the draft text, replace “anoxia” with “rapid onset of hypoxia” and add “increased hold-time” as potential ways to improve performance.
- Combine and simplify references to treatments that use “filtration” followed by oxidizing agents.
- Rephrase conclusions about the potential effects of combining treatment processes; i.e., revise from “would” improve performance to stating “could” improve performance.
- Emphasize the limits to anticipated improvements in BWMS performance achieved by “tweaking” existing technologies as contrasted anticipated improvements from developing completely “new approaches,” including use of systems-based process controls.

3. b. What are the principal constraints and impediments to shipboard treatment technologies?

There was broad agreement on the draft conclusions, with recommendations for only minor editorial revisions.

3.c . Recommendations for ways to address these constraints and impediments.

There was broad agreement on the draft conclusions, with recommendations for only minor editorial revisions.

3.d. Are these impediments more significant for some organisms or size classes? Can available shipboard technologies achieve sterilization, or zero or near-zero discharges for certain organisms?

There was broad agreement on the draft conclusions, with recommendations for only minor editorial revisions.

Charge question 4: What are the principal limitations of available studies on system performance?

The draft response to charge question 4 were presented in two categories: conclusions regarding limitations of available studies and conclusions regarding on-shore treatment. **Dr. Meyer** invited all panel members to comment on the draft conclusions. There was broad agreement on the draft conclusions about limitations of available studies, with suggestions for only minor editorial revisions.

The discussion on draft conclusions regarding onshore treatment led to the following revisions:

- The first bullet point should be revised from "preliminary estimates" to "screening level estimates."
- The second, third, and fourth bullet points are expansions of the first point and can be eliminated.
- The sixth point will be revised change it from a conclusion to a recommendation by deleting the beginning phrase "Since the evidence indicates…" and inserting a recommendation for further study, e.g., to begin "EPA should conduct further study of onshore treatment as potential alternative or complement to shipboard treatment. If the evidence shows …"
- The seventh and last point will be deleted.
- Onshore issues related to the logistical, operational, equipment requirements, and phase-in of on-shore treatment will be added to conclusions.

Dr. Myer then turned to the second part of question 4, regarding how to improve future assessments of shipboard treatment technologies. She invited comments on the draft recommendations, leading to the following decisions:

- The seventh bullet describing protocol development will be simplified and the supporting clauses deleted.
- The tenth bullet will be revised to urge EPA to develop metrics appropriate for compliance monitoring and enforcement as quickly as possible.
- The final two bullets will be combined and simplified.

The discussion of draft conclusions ended with a brief review of the draft conclusions regarding risk assessment and HACCP. There was general agreement on these draft conclusions and it was decided that the concept of risk assessment as applied to managing the risk of species invasions via ballast water would be introduced early in the report.

Discussion of Executive Summary and Letter to the Administrator:
Due to winter storm conditions in parts of the U.S. west and midwest that could lead to flight cancellations, Dr. Meyer offered the Panel the option to end the meeting early. The Panel elected to forego the lunch break and to continue with an abbreviated discussion of proposed content for the Executive Summary and the Letter to the Administrator.

For the Executive summary, the Panel discussed whether to structure the Summary in terms of: 1) summarizing all the charge questions, followed by a summary of answers, followed by a summary of the Panel recommendations, or 2) to go sequentially through the Charge questions and answers and then selected recommendations for inclusion in the Summary.

For the Letter to the Administrator, the Panel discussed the following points. First, the letter would be kept to 1-2 pages and not attempt to answer all the charge questions in detail, but rather to provide highlights. For available technologies, the draft Letter would note that there are available technologies that appear to meet the D2 standard and that could potentially meet 10x D2 standards. However, it was very difficult – for both practical and statistical reasons – for available shipboard technologies to meet the 100X and 1000X D2 standards. The draft Letter would point out that the best that technology can achieve is "non-detectable" organisms, not complete sterilization and that protocols were needed that could yield comparable results internationally. The draft Letter would point out that future management of ballast water could include more options, including process-based approaches like HACCP and onshore treatment, which could move toward a risk-based, systems-approach, which is currently not available. **Dr. Meyer** noted that she would work with **Ms. Goodman** to draft a preliminary draft Executive Summary and Letter to the Administrator, drawing from this discussion. She also said the drafts would be posted on the SAB web-site and for further discussion by the Panel during the March teleconferences.

For the final meeting topic, **Dr. Meyer** briefly described to the Panel the process used by the Chartered SAB to conduct a quality review of this Panel's report. She outlined the three criteria that would be used by the Chartered SAB: does the report answer the charge questions? Is the report clear and logical? Are the report's recommendation supported by statements within the text? **Dr. Meyer** also noted that, as members of the Chartered SAB, she and **Dr. Sanders** would have to recuse themselves from the Quality Review. **Dr. Vu**, Director of the Science Advisory Board Staff Office, also clarified that if the Quality Review requests substantive

questions about the report, that the Chair has the discretion to directly answer these questions or to call upon members of the Panel for assistance.

There being no further business, Ms. Goodman adjourned the meeting.

Respectfully Submitted:	Certified as Accurate:
/Signed/	*/Signed/*
Iris Goodman, Designated Federal Officer	Dr. Judith L Meyer, Chair SAB Ecological Processes and Effects Committee

NOTE AND DISCLAIMER: The minutes of this public meeting reflect diverse ideas and suggestions offered by Panel members during the course of deliberations within the meeting. Such ideas, suggestions and deliberations do not necessarily reflect consensus advice from Panel members. The reader is cautioned to not rely on the minutes to represent final, approved, consensus advice and recommendations offered to the Agency. Such advice and recommendations may be found in the final advisories, commentaries, letters or reports prepared and transmitted to the EPA Administrator following the public meetings.

ATTACHMENT A: COMMITTEE ROSTER

U.S. Environmental Protection Agency
Science Advisory Board
Ecological Processes and Effects Committee Augmented for the Ballast Water Advisory

CHAIR

Dr. Judith L. Meyer, Distinguished Research Professor Emeritus, Odum School of Ecology, University of Georgia, Lopez Island, WA

MEMBERS

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Dr. Amanda Rodewald, Associate Professor, School of Environment and Natural Resources, The Ohio State University, Columbus, OH

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Dr. Fred Dobbs, Professor and Graduate Program Director, Ocean, Earth and Atmospheric Sciences, College of Sciences, Old Dominion University, Norfolk, VA

Dr. Lisa Drake, Senior Scientist, Science Applications International Corporation, Key West, FL

Dr. Charles Haas, L.D. Betz Professor of Environmental Engineering, Civil, Architectural and Environmental Engineering, College of Engineering, Drexel University, Philadelphia, PA

Mr. Edward Lemieux, Director, Center for Corrosion Science Engineering, Naval Research Laboratory, Washington, DC

Dr. David Lodge, Professor, Biological Sciences, University of Notre Dame, Notre Dame, IN

Mr. Kevin Reynolds, Senior Marine Engineer, The Glosten Associates, Seattle, WA

Dr. Mario Tamburri, Associate Professor, Chesapeake Biological Laboratory, Maritime Environmental Resource Center, University of Maryland Center for Environmental Science, Solomons, MD, United States

Dr. Nicholas Welschmeyer, Professor of Oceanography, Moss Landing Marine Laboratories, San Jose State University, Moss Landing, CA

SCIENCE ADVISORY BOARD STAFF

Dr. Thomas Armitage, Designated Federal Officer, U.S. Environmental Protection Agency, Washington, DC

Ms. Iris Goodman, Designated Federal Officer, U.S. Environmental Protection Agency, Washington, DC

Attachment B:

Members of the public who requested the call-in number for Jan. 25 – 26 meeting.

Thomas Cmar, Natural Resources Defense Council
Jack Cooper, Food Industry Environmental Network, LLC
Nicole Dobroski, California Lands Commission, Marine Invasive Species Program
Peter McNulty, President, N.E.I.
Burleson Smith, Policy Navigation
Raymond Vaughan, New York State Attorney General's Office

In-person attendance: January 25, 2013
Ryan Albert, U.S. EPA, Office of Water
Jim Cosman, Market Manager, TrojanUV Ballast Water Treatment
Richard Everett, U.S. Coast Guard
Dawn K. Champky, WWEMA
Gary Croot, U.S. Coast Guard
Marvourneen Dolor, U.S. Department of Transportation
Dan Kroll, Hach
Douglas Schneider, World Shipping
Jim Weakley, LCA Ships
Bryan Wood Thomas, World Shipping

In-person attendance: January 26, 2013
Ryan Albert, US EPA, Office of Water
Jim Cosman, Market Manager, TrojanUV Ballast Water Treatment
John Heltman, Inside EPA
Maureen Dolor

Materials Cited

The following meeting materials are available on the SAB website, http://www.epa.gov/sab, at the January 25-26, 2011, Ecological Processes and Effects Committee meeting page:

http://yosemite.epa.gov/sab/sabproduct.nsf/a84bfee16cc358ad85256ccd006b0b4b/3970fe387896ffd8852577eb0068c628!OpenDocument&Date=2011-01-25

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[1] Federal Register Notice of the Meeting, 75 FR 80048
[2] Meeting Agenda, January 25-26, 2011
[3] Summary of example deballasting operations.
[4] Public comments from Dr. Vaughan, New York State Attorney General's Office.
[5] Preliminary comments from Dr. Welschmeyer on compilation of draft text.
[6] Compilation of draft text prepared by individual subgroups of the SAB EPEC Ballast Water Advisory Panel in response to charge questions.
[7] Subgroup 4 Draft text on Onshore Treatment.
[8] Draft Appendices on Onshore Treatment, to accompany Part VI, Section 5 of Compiled Draft Texts.